

**IRC14-0280**

**03h. Plant and crop physiology and crop modelling**

**MODIFICATIONS OF RICE PLANT DEVELOPMENT INDUCED BY AEROBIC SOIL CONDITIONS**

B. Clerget<sup>1</sup>, C. Bueno<sup>2</sup>, E. Foronda<sup>2</sup>, E. Duque<sup>2</sup>, A. Macabuhay<sup>2</sup>, H.L. Layaoen<sup>2</sup>, A. Domingo<sup>2</sup>

<sup>1</sup>BIOS, Cirad, Montpellier, France

<sup>2</sup>CESD, International Rice Research Institute, Los Baños, Philippines

**Purpose:**

Increasing water cost and scarcity drive rice farmers in many regions to switch to less water-consuming systems. For maximized water savings, aerobic crop management with direct seeding and regular short irrigations for saturated soil water content can be done. Current researches aim to usher this transition without sacrificing the yield.

**Approach and methods used:**

Identical rice varieties were sown and grown simultaneously under aerobic and flooded soil environments in the field and in the greenhouse. Crop growth and development in all the experiments were monitored weekly.

**Key results:**

Grain yields and shoot biomasses were reduced by 1 to 2 tons/ha and 2 to 4 tons/ha, respectively, in 1-ha aerobic plots. The total number of leaves from the main tillers, individual leaf areas, plant height, number of grains per panicle, individual grain-weight and N-content for the entire plant life were also lower while the number of tillers produced per area was higher under aerobic conditions. Meanwhile, shoot biomasses were equal during flowering time in both environments when the plant density was high in aerobic crops. As for the leaf appearance rate, the decline was sharper and earlier in aerobic crops (after leaf 8) than in flooded crops (after leaf 12).

Experiments in small plots and pots were carried out to quantify the individual effects of sowing density, planting method, and variety on the development rate of the plants. It was found out that all the three factors, previously confounded, influence the development rate. In small experimental plots managed with full manual weeding and late N-application, the grain yield from aerobic crops was nearly the same with that from the flooded crops. However, the same could not be achieved for larger plots in spite of the precise water management. Weed control and possibly N-application timing would be crucial to get the same result.

**Synthesis and Applications:**

It can be expected that finer-tuned crop management combined with specifically-bred varieties could lead to an insignificant yield gap between the aerobic and flooded environments. Further studies are now implemented to further understand the impact of modification in soil water content to the plant development.